

ISTEP+: Algebra I
End of Course Assessment
Released Items and Scoring Notes

Introduction

The *Algebra I Graduation Examination* End of Course Assessment (ECA) consists of four item types which contribute to a student's scale score: multiple-choice, constructed-response, gridded response and graphing items. It is important to keep in mind that a significant portion of a student's score is calculated from the multiple-choice items on the assessment, which are not addressed within this document.

This document consists of constructed-response and graphing items from the Spring 2016 administration and includes:

- Sample released open-ended questions
- Rubrics used by trained evaluators to score student responses
- Sample papers used by trained evaluators to distinguish between rubric score point values
- Notes describing the rationale for scoring student responses

The purpose of this guide is to provide additional Algebra I ECA sample items and to model the types of items on the ECA that are scored using rubrics.

Reporting Category 1: Solving Linear Equations and Inequalities

Question 1

The sum of two consecutive odd integers is 376.

Let x represent the first integer. Write an equation that can be used to find the first integer.

Answer

What are the two consecutive odd integers whose sum is 376?

Answer

Exemplary Response:

Part A

- $x + (x + 2) = 376$ OR $x + (x - 2) = 376$
Or other equivalent equation.

Note: Student should be given credit if a correct system of equations is given, such as shown below.

$$y - x = 2$$

$$y + x = 376$$

Part B

- 187 and 189

RUBRIC:

2 points Exemplary response. Correct equation in Part A and two correct integer responses in Part B.

1 point Correct equation in Part A or two correct integer responses in Part B. Or, a correct equation in Part A and only one correct integer response in Part B. Or, two correct consecutive odd integers in Part B based on an incorrect linear equation in Part A.

0 points Other

Solution:

$$x + (x + 2) = 376$$

$$2x + 2 = 376$$

$$2x = 374$$

$$x = 187$$

$$187 + 2 = 189$$

$$187 + (187 + 2) = 376 \text{ check}$$

Question 1, Sample A – 2 points

Part A: $x+x+2=376$

Part B: 187, 189

Notes: This response is equivalent to the exemplary response.

Question 1, Sample B – 1 point

Part A: $x+x+2x=376$

Part B: 187, 189

Notes: The response in Part A is incorrect; however, the answer in Part B is correct.

Question 1, Sample C – 1 point

Part A: $2x+2=376$

Part B: $2x$ and 2

Notes: The response in Part A is correct as it is equivalent to the exemplary response; however, the answer in Part B is incorrect.

Question 1, Sample D – 0 points

Part A: $376/2=x$

Part B: 188

Notes: Parts A and B are both incorrect.

Reporting Category 1: Solving Linear Equations and Inequalities

Question 2

A normal work day for Tia is 6 hours. She wants to work an additional 15 minutes on some work days to earn more money.

Next month, Tia will work 20 days. She will work an additional 15 minutes on $\frac{4}{5}$ of her work days next month.

How many hours will Tia work next month?

Answer _____

Next month, how much money will Tia earn, in dollars, if she earns \$8.50 per hour?

Answer _____

Exemplary Response:

Part A

- 124

Part B

- \$1,054

RUBRIC:

2 points	Exemplary response. Correct solution in Part A and correct solution in Part B.
1 point	Correct solution in Part A or correct solution in Part B. Or, correct solution in Part B based on an incorrect solutions in Part A.
0 points	Other

Solution:

Part A:

$$h = 20(6) + 20(4/5)(1/4)$$

$$h = 120 + (16)(1/4)$$

$$h = 120 + 4$$

$$h = 124$$

Part B:

$$124(\$8.50) = \$1,054$$

Scoring Note:

If Part A answer is multiplied by \$8.50, then accept Part B answers that are:

- a) Rounded to the nearest dollar up or down.
- b) Rounded to the nearest penny.
- c) Truncated at the penny.

Question 2, Sample A – 2 points

Part A: 124 hours

Part B: \$1,054

Notes: This response is equivalent to the exemplary response.

Question 2, Sample B – 1 point

Part A: 124 hours

Part B: 10.54\$

Notes: The response for Part A is correct; however, the response for Part B is incorrect as it is off by two orders of magnitude or a factor of one hundred.

Question 2, Sample C – 1 point

Part A: 31 hours

Part B: \$1,054

Notes: The response for Part A is incorrect; however, the response for Part B is correct.

Question 2, Sample D – 0 points

Part A: 122 full hours

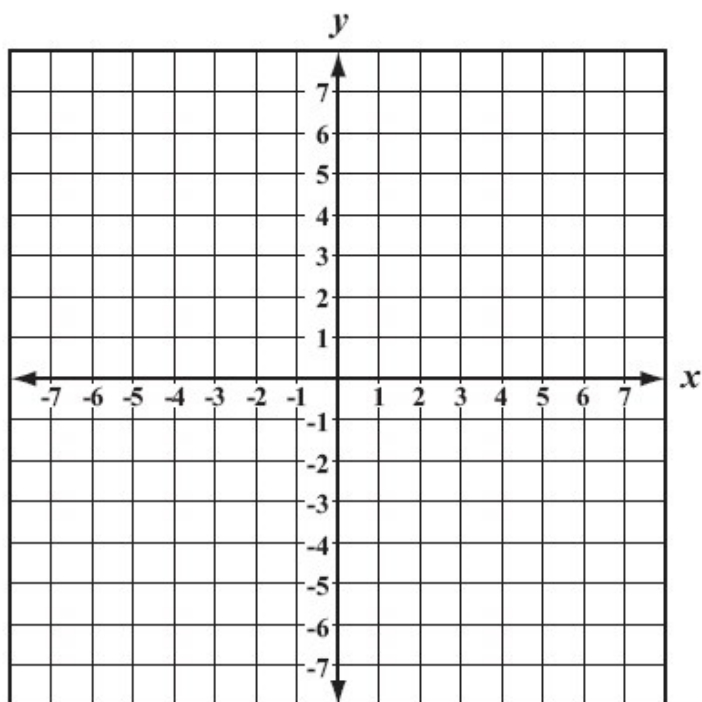
Part B: \$1,040.40

Notes: Parts A and B are both incorrect.

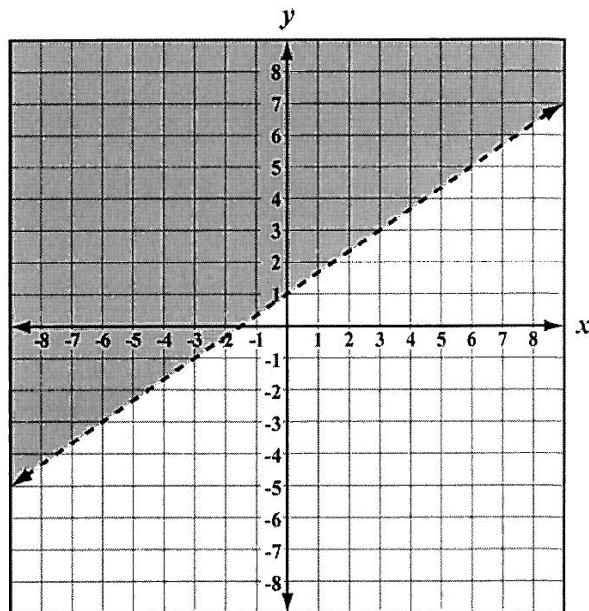
Reporting Category 2: Graphing and Interpreting Linear and Non-Linear Relations

Question 3

Graph: $y > \frac{2}{3}x + 1$



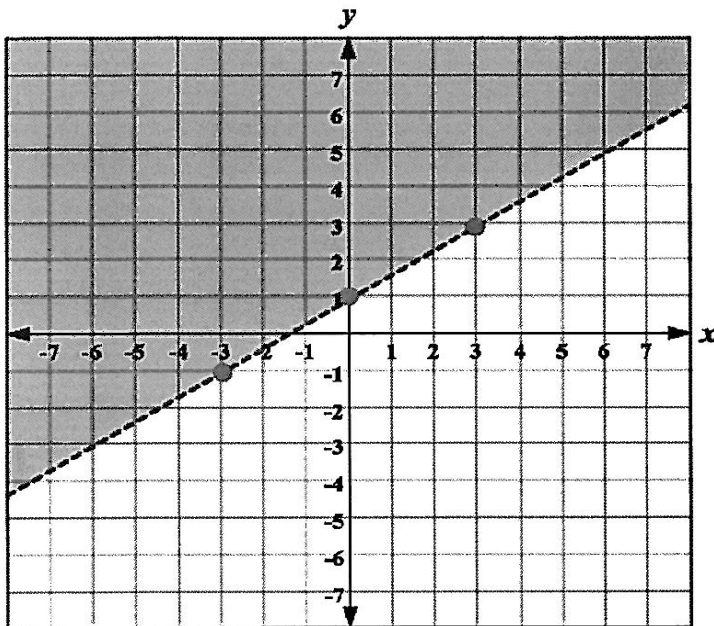
Exemplary Response:



RUBRIC:

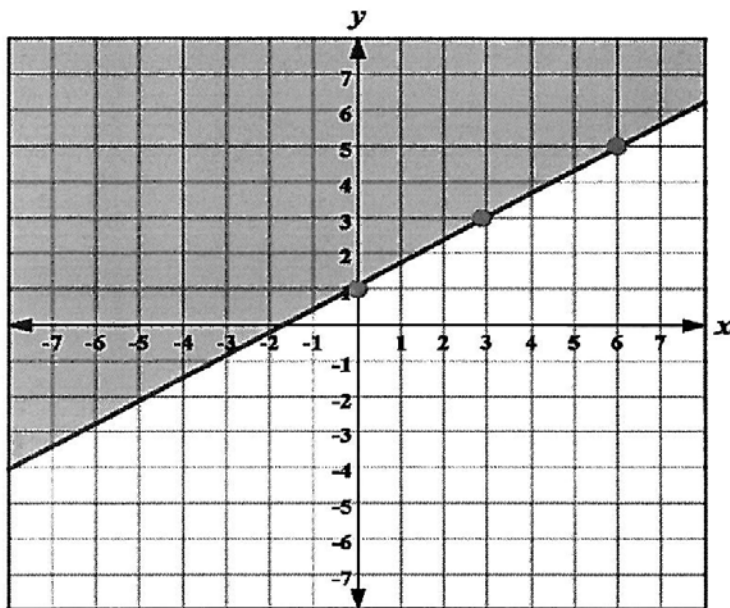
- | | |
|-----------------|---|
| 2 points | Exemplary response. |
| 1 point | Graph of $y = \frac{2}{3}(x) + 1$ using a solid or a dashed line with incorrect or no shading. Or, an incorrect dashed line shaded correctly. Note: If more than 1 line is graphed or additional incorrect points are plotted, no points will be awarded. |
| 0 points | Other |

Question 3, Sample A – 2 points



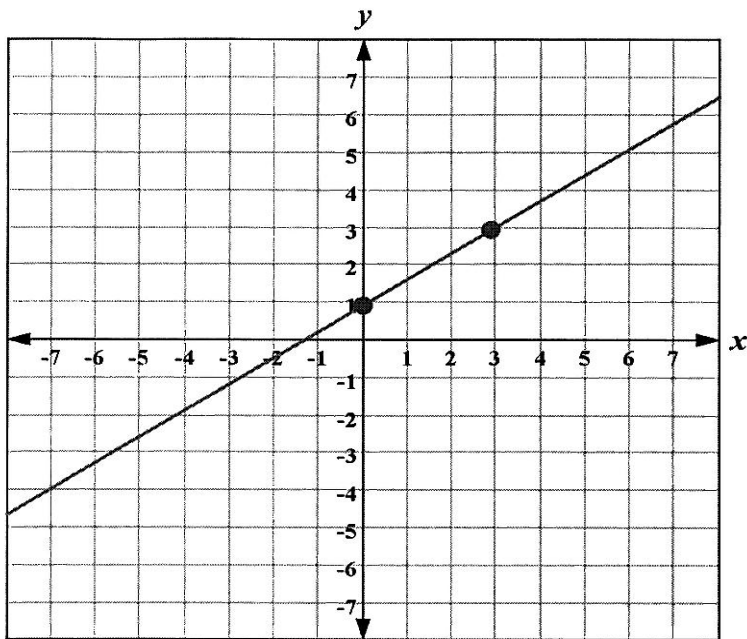
*Correct graph of $y = (2/3)x + 1$ with correct dashed line.
Correctly shaded.*

Question 3, Sample B – 1 point



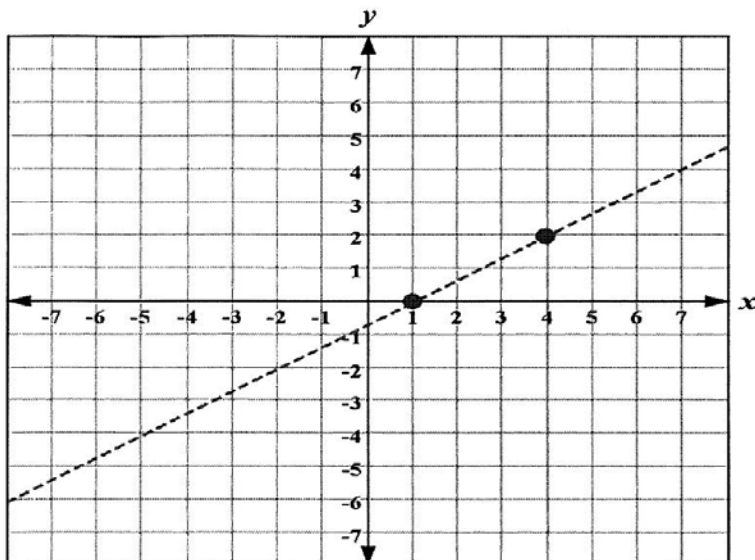
*Correct graph of $y = (2/3)x + 1$ with an incorrect solid line.
Correctly shaded.*

Question 3, Sample C – 1 point



*Correct graph of $y = \frac{2}{3}x + 1$ with an incorrect solid line.
No shading.*

Question 3, Sample D – 0 points

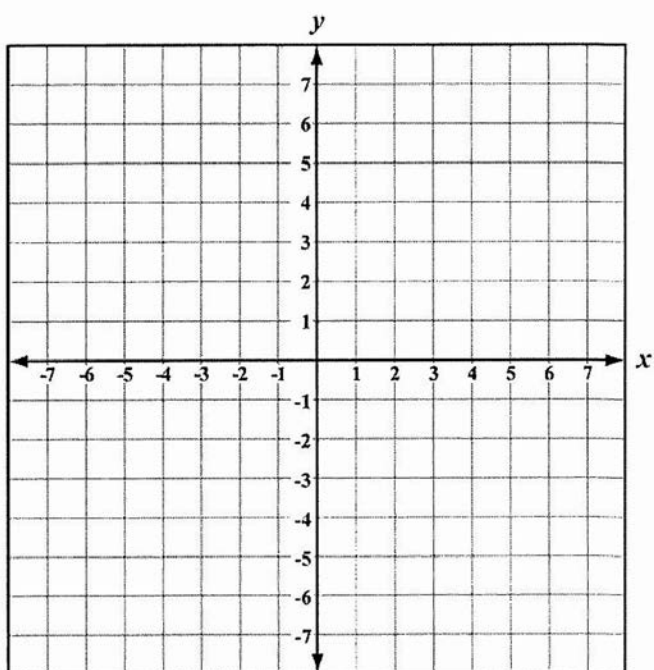


*Incorrect graph of $y = \frac{2}{3}x + 1$ with a dashed line.
No shading.*

Reporting Category 2: Graphing and Interpreting Linear and Non-Linear Relations

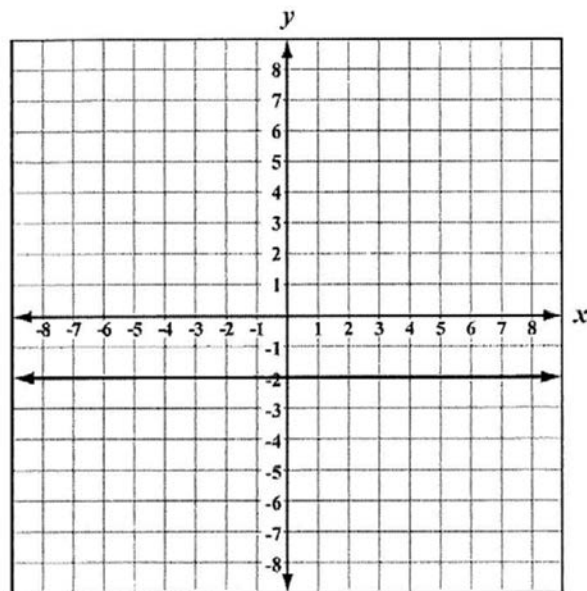
Question 4

Graph: $y = -2$



Exemplary Response:

Graph of $y = -2$



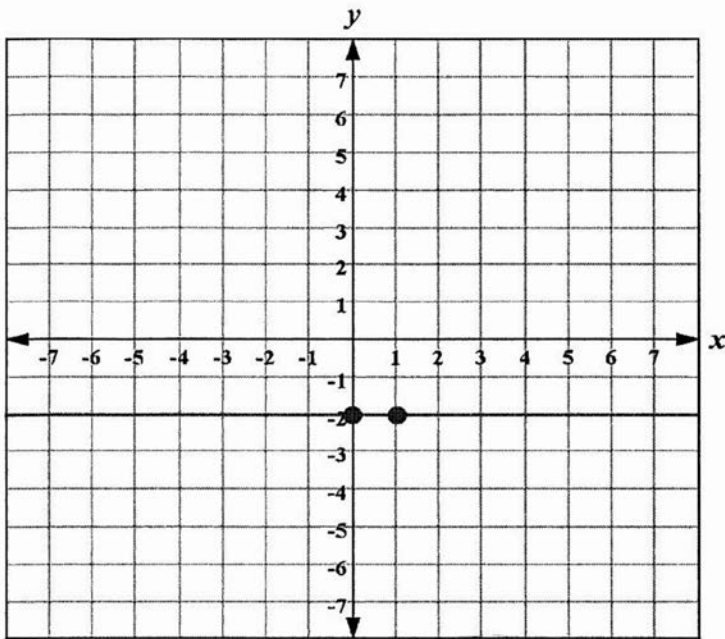
RUBRIC:

1 point Exemplary response.

0 points Other

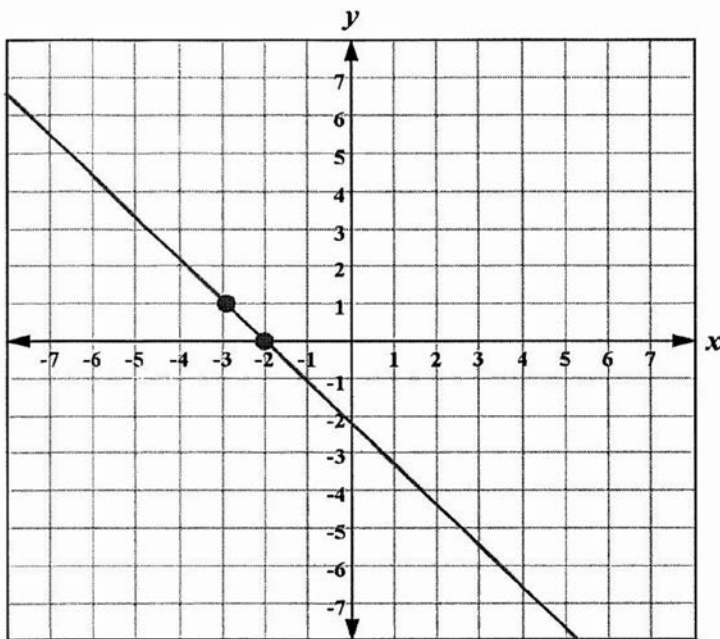
Note: If more than one line is graphed, or additional incorrect points are plotted, no points will be awarded.

Question 4, Sample A – 1 point



Correct graph with two correct points plotted, (0, -2) and (1, -2).

Question 4, Sample B – 0 points

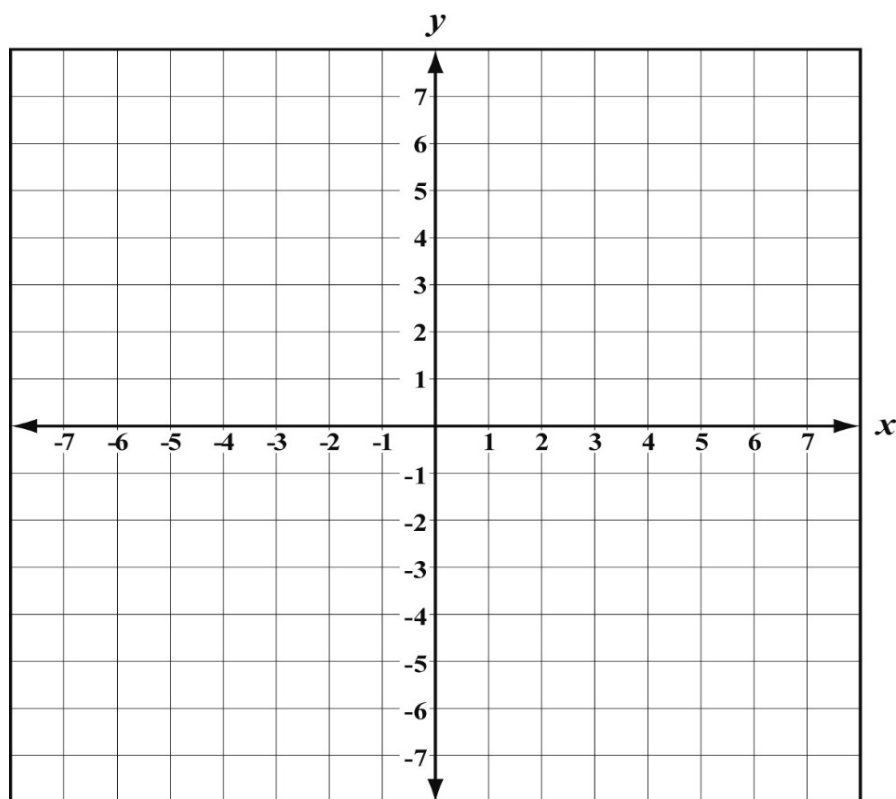


Incorrect graph.

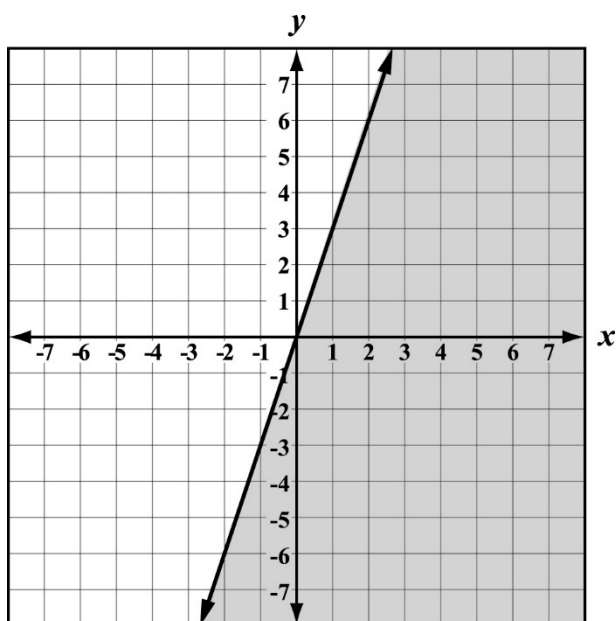
Reporting Category 2: Graphing and Interpreting Linear and Non-Linear Relations

Question 5

Graph: $2y \leq 6x$



Exemplary Response:



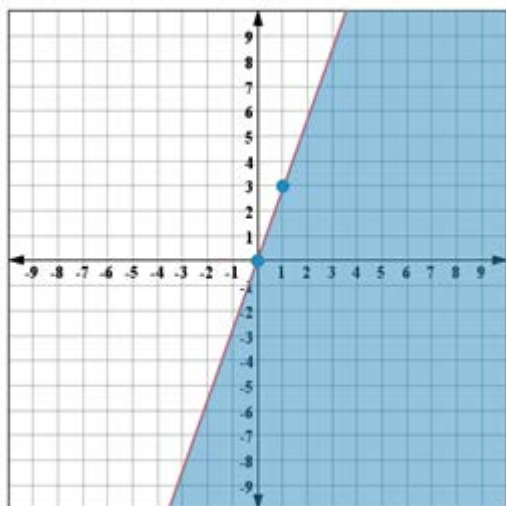
RUBRIC:

2 points Exemplary response.

1 point Graph of $y = 3x$ using a solid or dashed line with incorrect or no shading. Or, an incorrect solid line shaded correctly. Note: if more than 1 line is graphed, no points will be awarded.

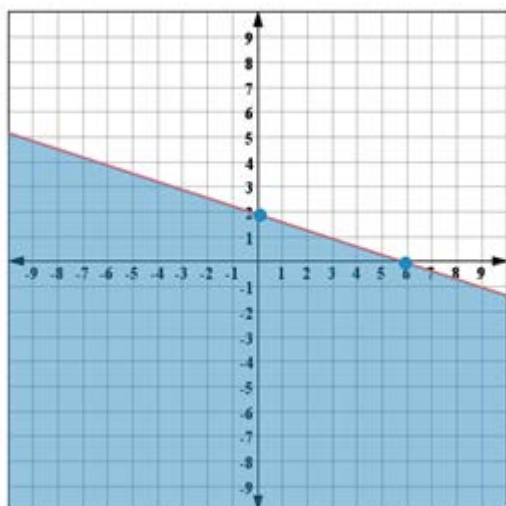
0 points Other

Question 5, Sample A – 2 points



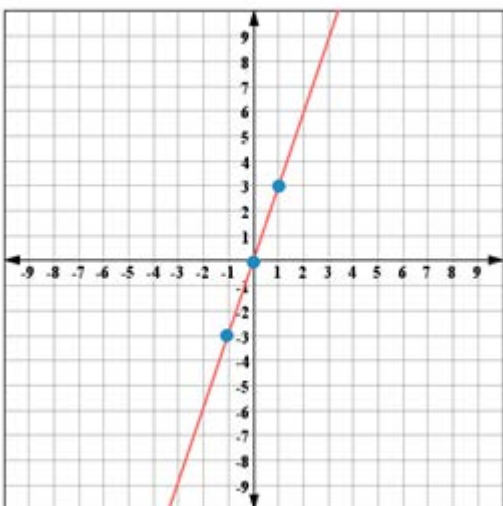
This response is equivalent to the exemplary response.

Question 5, Sample B – 1 point



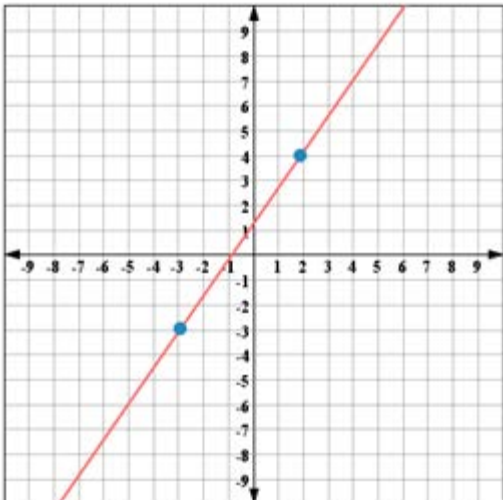
An incorrect solid line but part of the correct area or region is shaded.

Question 5, Sample C – 1 point



A correct solid line but without any shading.

Question 5, Sample D – 0 points



An incorrect solid line without any shading.

Reporting Category 2: Graphing and Interpreting Linear and Non-Linear Relations

Question 6

What are the slope and y-intercept of the graph of $-2x - 5y = 15$?

slope =

y-intercept =

Exemplary Response:

Part A

- $-2/5$

Part B

- -3 or $(0, -3)$

RUBRIC:

2 points Exemplary response. Correct slope and correct y-intercept given.

1 point One key element. Correct slope. Or, correct y-intercept given. Or, correct values switched.

0 points Other

Solution:

$$-2x - 5y = 15$$

$$-5y = 2x + 15$$

$$y = (-2/5)x - 3$$

$$m = -2/5$$

$$b = -3$$

Question 6, Sample A – 2 points

$$-2/5$$

$$-3$$

This response is equivalent to the exemplary response.

Question 6, Sample B – 1 point

$$\text{slope} = -2/5x$$

$$\text{y-intercept} = -3$$

The slope is incorrect, but the y-intercept is correct.

Question 6, Sample C – 1 point

$$-2/5$$

$$(0, 3)$$

The slope is correct, but the y-intercept is incorrect. The y-coordinate is the negative of the correct y-intercept.

Question 6, Sample D – 0 points

$$2/5x$$

$$3$$

Both the slope and y-intercept are incorrect.

Reporting Category 2: Graphing and Interpreting Linear and Non-Linear Relations

Question 7

What is the y -intercept of $-4x + y = 20$?

Write an equation of a line that is parallel to $-4x + y = 20$.

Exemplary Response:

Part A

- $(0, 20)$, OR $y = 20$, OR 20

Part B

- $y = 4x + b$, with any given value of b acceptable, excluding b equal to 20. Other formats of equation for a line with a slope of 4 are also acceptable.

RUBRIC:

2 points Exemplary response. Correct intercept value given in Part A and a correct equation in Part B.

1 point Correct intercept value given in Part A. Or, a correct equation in Part B.

0 points Other

Solution:

Part A:

$$-4(0) + y = 20$$

$$y = 20$$

Part B:

$$-4x + y = 20$$

$$y = 4x + 20 \quad m = 4$$

$$y = 4x + b \quad (\text{where } b \text{ does not equal } 20)$$

Question 7, Sample A – 2 points

20 = y-intercept

$$y = 4x + 10$$

This response is equivalent to the exemplary response.

Question 7, Sample B – 1 point

20 = y-intercept

$$-5x + y = 20$$

The slope ($m = 5$) is incorrect, but the y-intercept is correct.

Question 7, Sample C – 1 point

5 = y-intercept

$$-4x + y = 24$$

The y-intercept ($b = 5$) is incorrect, but the equation of a parallel line is correct.

Question 7, Sample D – 0 points

y-intercept = 16

$$y = 4x + 20$$

Both the y-intercept and equation of a parallel line are incorrect.

Reporting Category 3: Systems of Linear Equations and Inequalities

Question 8

For a night-time charity walk, the cross-country and track teams each purchased packages of balloons and candles to border the track. The cross-country team spent a total of \$47.50 for 2 packages of balloons and 150 candles. The track team spent a total of \$30.00 for 1 package of balloons and 100 candles.

Each package of balloons costs the same amount. Each candle costs the same amount.

Write a pair of linear equations that can be used to find the cost of each package of balloons (b) and the cost of each candle (c).

Answer

What is the total cost, in dollars, of one package of balloons and one candle?

Answer

Exemplary Response:

Part A

- $2b + 150c = \$47.50$
 $1b + 100c = \$30.00$
Or other equivalent system of equations.

Part B

- \$5.25
Note: Student receives full credit if response given indicates separately that 1 package of balloons costs \$5.00 and 1 candle costs \$0.25.

RUBRIC:

2 points Exemplary response. Correct system given in Part A. Correct value in Part B.

1 point One key element. Correct system of equations only. Or, correct value in Part B only. Or, a correct answer in Part B based on an incorrect system of equations given in Part A that shows partial understanding of the problem.

0 points Other

Solution:

$$2b + 150c = \$47.50$$

$$1b + 100c = \$30.00 \quad b = 30 - 100c$$

$$2(30 - 100c) + 150c = \$47.50$$

$$60 - 200c + 150c = \$47.50$$

$$60 - 50c = \$47.50$$

$$-50c = -\$12.50$$

$$c = \$0.25$$

$$1b + 100(\$0.25) = \$30.00$$

$$b + \$25 = \$30$$

$$b = \$5$$

$$\text{Total} = b + c = \$5.25$$

Question 8, Sample A – 2 points

Part A: $47.5=2b+150c$

$$30=b+100c$$

Part B: total cost=\$5.25

Notes: This response is equivalent to the exemplary response.

Question 8, Sample B – 1 point

Part A: $2b + 150c = 47.50$

$$1b + 100c = 30.00$$

Part B: $b = \$5$

$$c = .25 \text{ cents}$$

Notes: The response in Part A is correct; however, the solution in Part B is incorrect as either 25 cents or \$0.25 dollars is correct, but not .25 cents.

Question 8, Sample C – 1 point

Part A: $2x + 150y = 47.50$

$$x + 100y = 30.00$$

Part B: $b = \$.25$

$$c = \$5.00$$

Notes: The response in Part A is correct; however, the solution given in Part B is reversed from a correct response. Each candle costs 25 cents. Each balloon costs \$5.

Question 8, Sample D – 0 points

Part A: $2b+150c > 47.50$

$b+100c > 30.00$

Part B: balloons cost 12 dollars

candles cost 4 dollars

Notes: Parts A and B are both incorrect.

Reporting Category 4: Solving and Graphing Quadratic Equations

Question 9

Solve for x : $0 = x^2 - 5x - 24$

Answer

Exemplary Response:

- $x = 8$ or $x = -3$

OR

- $x = -3, 8$

RUBRIC:

2 points Exemplary response. Two correct solutions.

1 point One correct solution. Or, solutions of $x = -8, 3$. Or, an answer left not simplified.

[e.g. $(5 \pm 11)/2$]

0 points Other

Solution:

$$0 = x^2 - 5x - 24$$

$$0 = (x - 8)(x + 3)$$

$$x - 8 = 0$$

$$x = 8$$

OR

$$x + 3 = 0$$

$$x = -3$$

Question 9, Sample A – 2 points

Answer: $x^2 - 5x - 24 = 0$
 $(x - 8)(x + 3) = 0$
 $x = 8$
 $x = -3$

Notes: This response is equivalent to the exemplary response.

Question 9, Sample B – 1 point

Answer: $x = 8$
 $x = 3$

Notes: $x = 8$ is correct. $x = 3$ is incorrect.

Question 9, Sample C – 1 point

Answer: -8, 3

Notes: The pair of answers are the negatives (opposites) of the correct answers.

Question 9, Sample D – 0 point

Answer: $(x + 3)(x + 8)$

Notes: This response is incorrect.